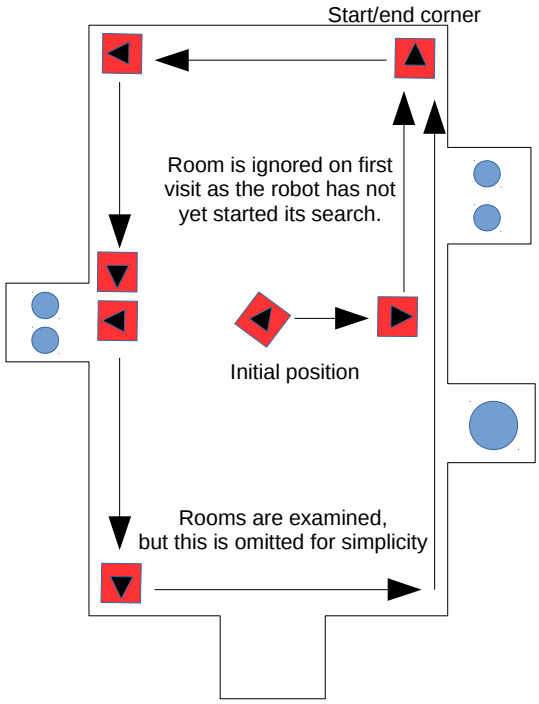
Approach

In a nutshell

- Move to a corner, start there, follow each wall and stop at the fourth corner (see diagram on right).
- Use odometry and lasers (when reliable – see below) for driving and turning.



Interesting points

Moving the robot to a corner to start from

- A 180 (rather than 360) degree laser scan is used to find the nearest wall and reorientate the robot. Motivation: speed

Turning an angle

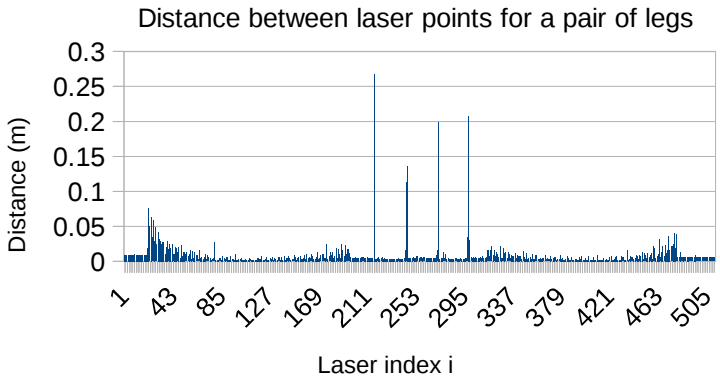
- The robot turns quickly using odometry until the last 5 degrees. The last amount is turned slowly. Motivation: speed, accuracy and reliability
- If turning next to a wall, two lasers on the right are then used to line the robot up parallel with the wall, otherwise odometry is used (as the lasers could pick up room contents).

Driving and room detection

- Similar to turning, driving is done quickly until the last 0.6m, which is done slowly. The robot will stop 0.4m away from a wall. Two right lasers are also used keep the robot parallel with the wall and 0.4m away on the right. The right laser is used to detect rooms by looking for a jump between 0.75m and 2m.
- Driving a specific distance is used to centre the robot in front of a room (based on assumptions below).

Analysing room content

- Jumps of 0.1m between two lasers points are used to indicate an object's edge. Sometimes (as shown in the graph where i=245 and 246), multiple 0.1m jumps per edge are detected. Thus, once a 0.1m jump has been found, any jumps within 5 laser indexes away are ignored.
- If an object is placed near a wall one of the edges may not be detected. To minimise this, a ceiling function is used after edges are divided by two.



Assumptions

- The robot is not initially placed facing, or in, a room, or less than 0.4m away from a wall
- Walls/corners/rooms contain no gaps
- Rooms are one short panel in length and width and not positioned at any corner of the main room. That is, there is at least a short panel length between any corner and nearby room
- There are no corridors leading to secondary rooms with additional side rooms to visit
- Any person in a room will have their feet facing the entrance and spaced apart.
- Any object in a room will be in the centre of the room